

# **How I View the Wind-Diesel Landscape in Alaska**

Presented by  
Dennis Meiners  
Alaska Energy Authority  
September 2002

# AIDEA/AEA Programs

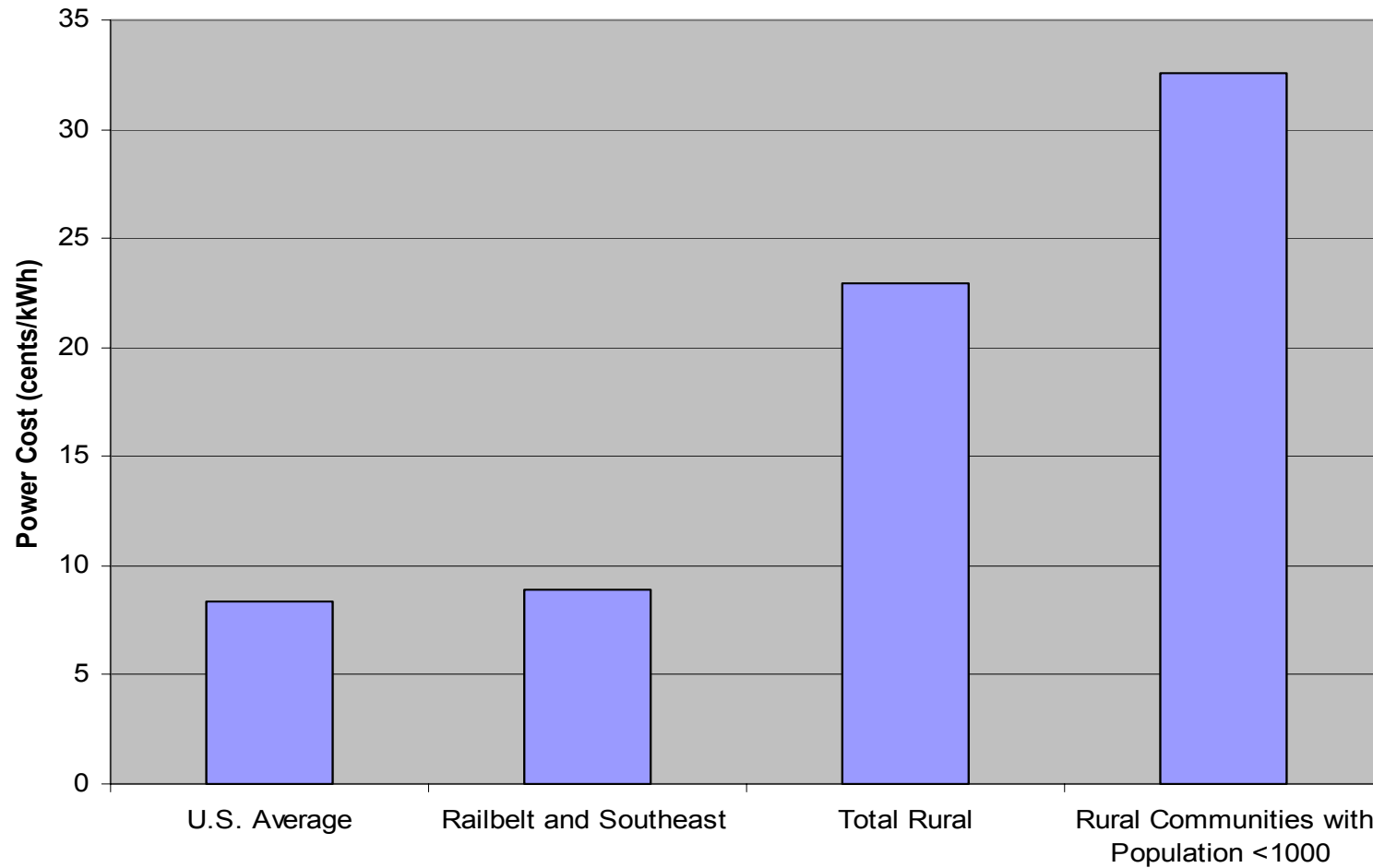
- Financing, Loans/Bonds/Grants
- Power Cost Equalization Program
- Rural Power Systems Upgrades
- Bulk Fuel Storage Upgrades
- Alternative Energy/Conservation/Planning
- Training and Assistance

# Agenda

- Markets, Resources, Technology
- The here and now
- What comes after what comes next

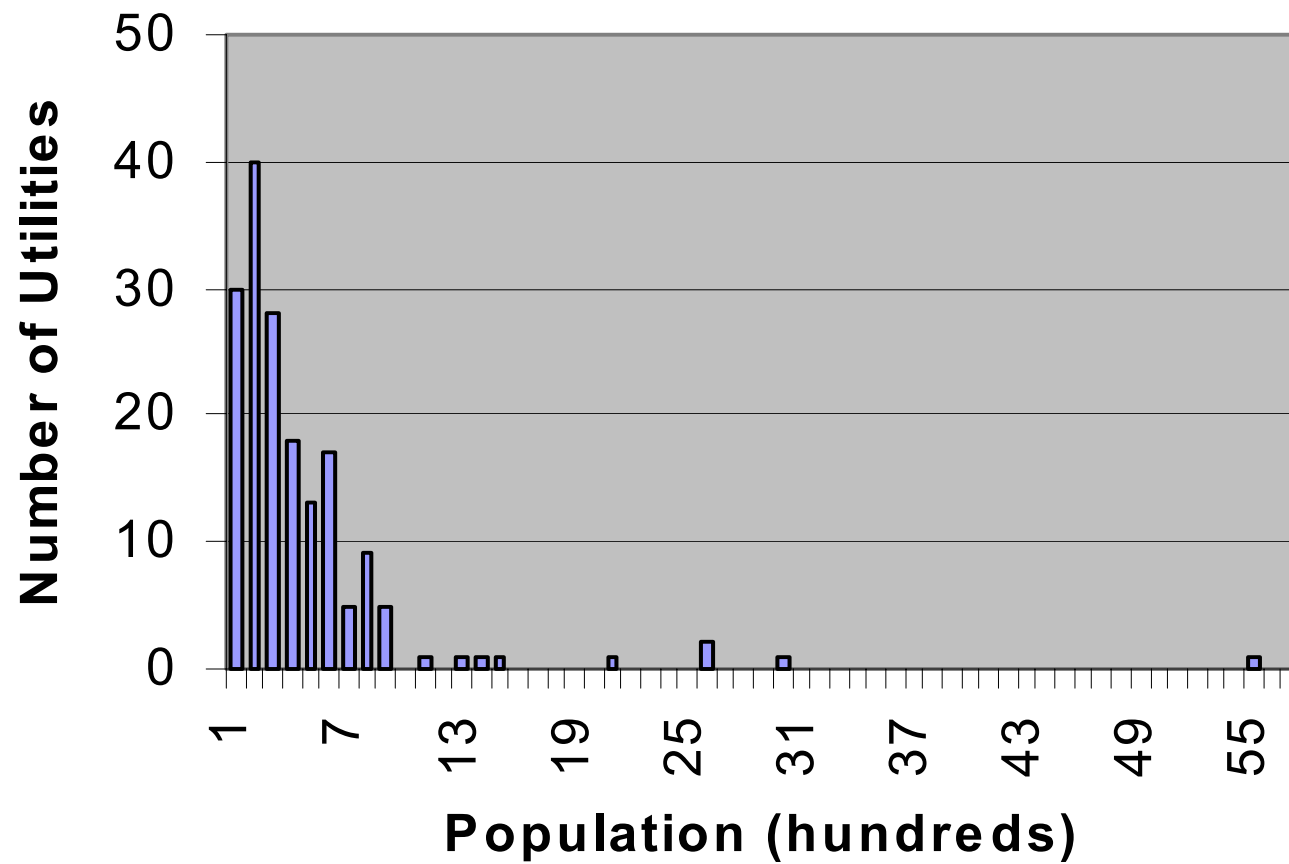
# Market

**Average Delivered Power Cost: Selected Alaskan Regions and the United States**



# Market

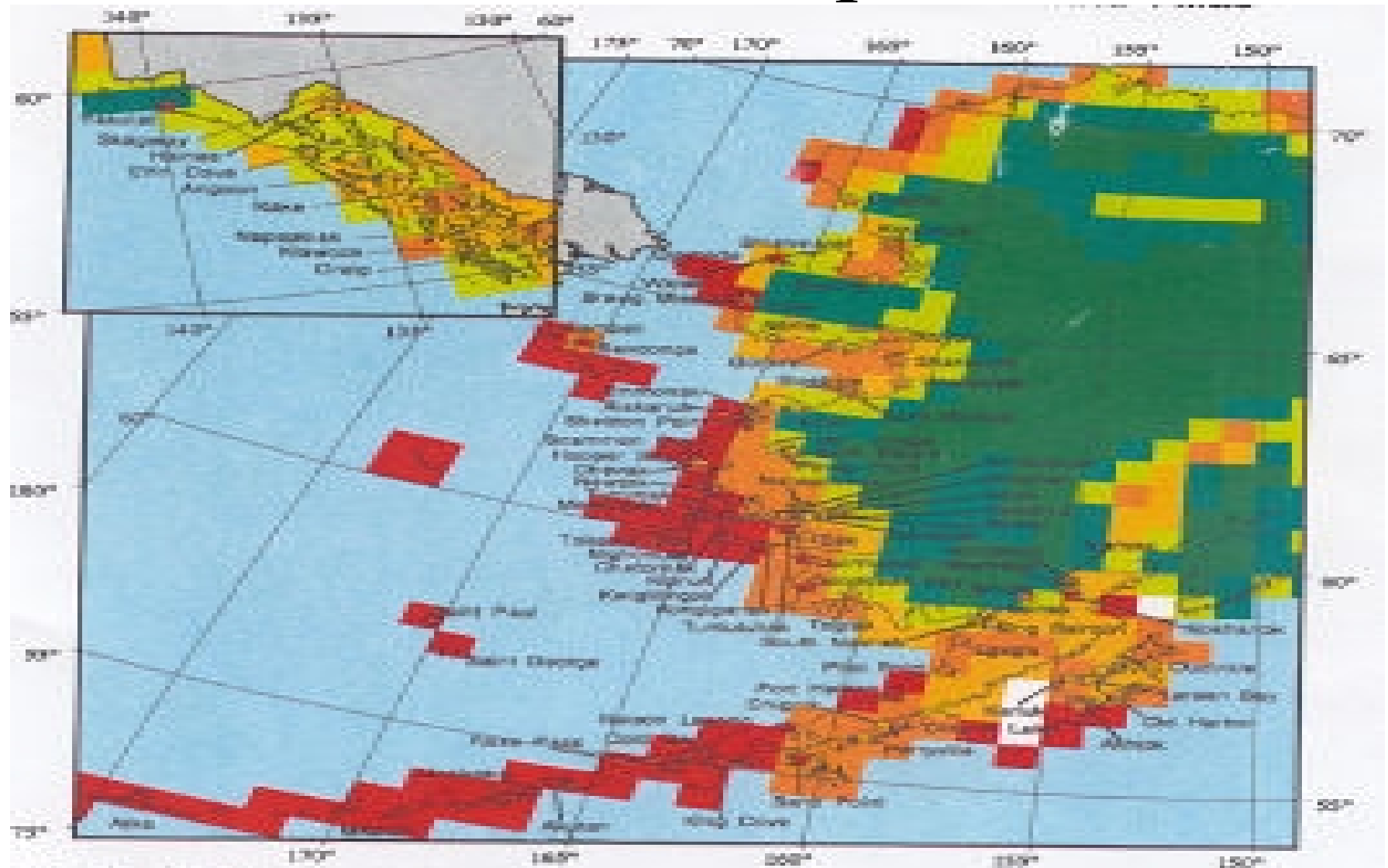
**Population Distribution of Rural Utilities**



# Generation Options/Issues

<b><u>Combustion</u></b>	Proven	Fuel Avail	Service	Special needs	Cost	Where is it?
Diesel	Yes	Yes	Yes	No	\$.15 +	In
Coal/biomass	Yes	Depends	Yes	No	\$. 20 +	On the steps
Natural Gas	Yes	?	Yes	No	High	unknown
Micro turbines	?	?	?	Yes	?	unknown
Fuel Cells	?	?	No	Yes	?	out
<b><u>Renewables</u></b>						
Hydro	Yes	Site	Yes	No	\$3-10,000	In
Tidal	No	Site	No	Yes	\$3-\$20,000	Maybe on the steps
PV	Yes	Sometimes	Could be	No	+,- \$.50	Using
Geothermal	Yes	Site	No	Yes	?	Maybe on Steps
Wind	Getting there	Site	On its way	Some	\$- or + .15	Just inside the door

# Wind Resource Map of Alaska



# Villages with Good Wind Potential

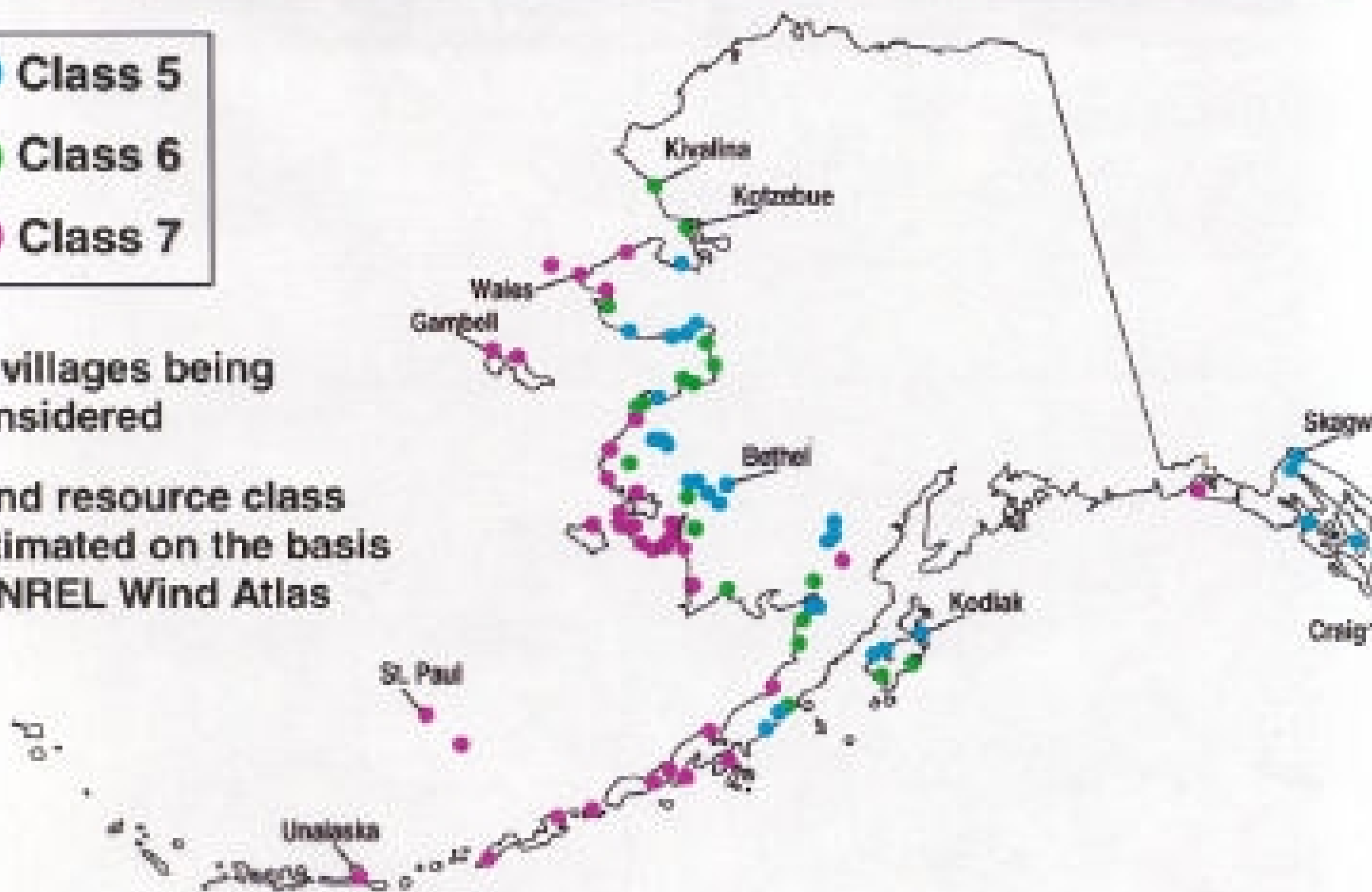
● Class 5

● Class 6

● Class 7

90 villages being considered

Wind resource class estimated on the basis of NREL Wind Atlas





# Why wind diesel?

## Diesel:

- Everybody has a diesel power plant
- Fuel and service infrastructure
- Relatively low capital cost
- Building new plants

# What is Available Now in Alaska

- Complete systems in the design stages now. As current systems are proven, enhancements are being made.
- Kotzebue Electric Association (KEA) in Kotzebue, Alaska
- KEA, State of Alaska and Alaska Village Electric Cooperative are adding 120 kW of wind generation to a 100 kW diesel grid in Wales,
- Tanadgusix Corporation and Northern Power Systems have constructed and are operating 225 kW of wind generation hybridized with 300 kW of diesel generation on St. Paul Island, AK

So..now that Wind part of our  
plan.....

- Is there a wind turbine?
- How much should we put in?
- How do we use it?
- Can it be done cost effectively?

# Cost Factors

- Project Management/Complementing
- Standardizing
- Combining
- Grouping

# Villages with Good Wind Potential

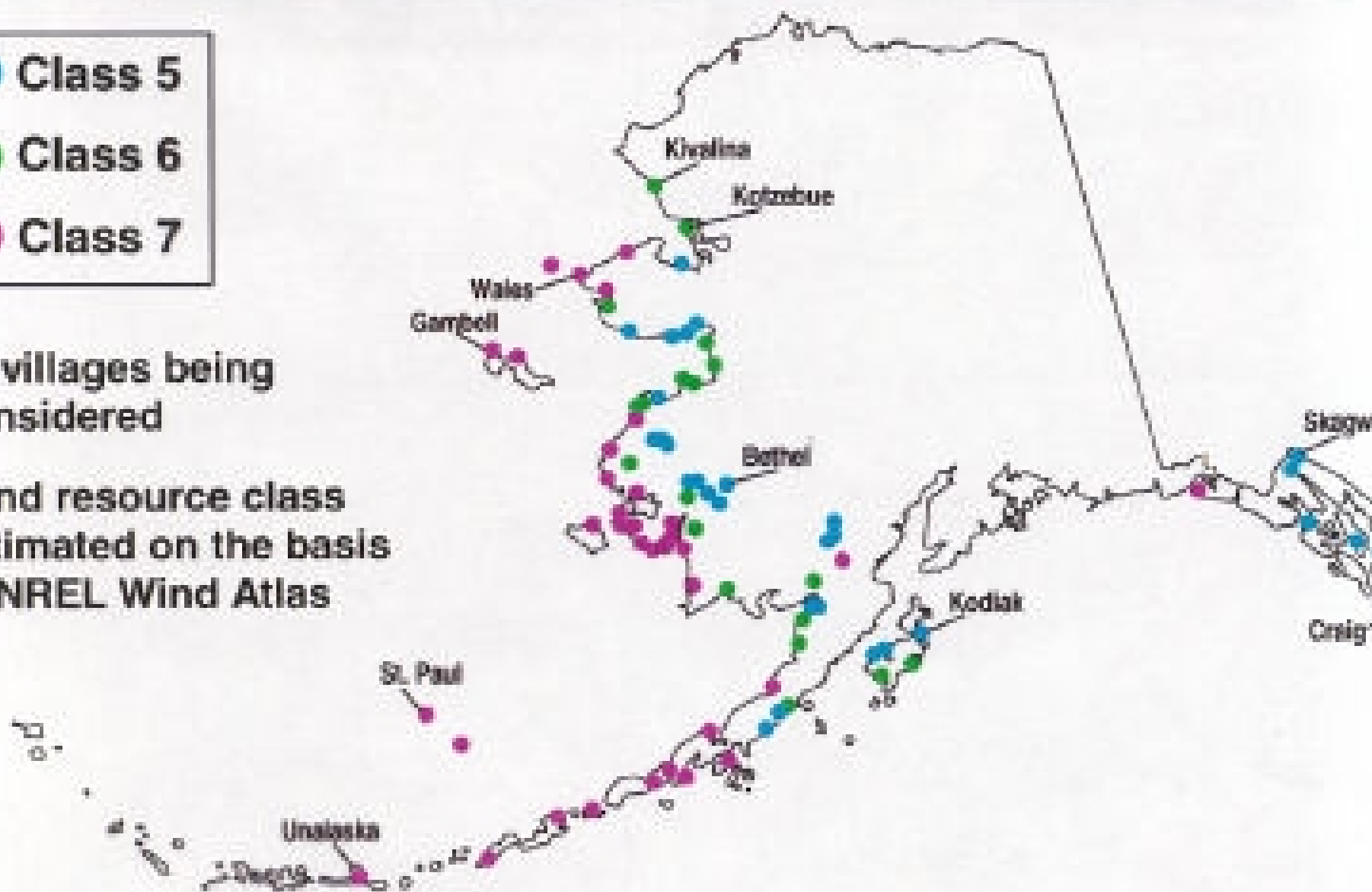
● Class 5

● Class 6

● Class 7

90 villages being considered

Wind resource class estimated on the basis of NREL Wind Atlas





# Gambell

- Population: 653
- Utility: Alaska Village Electric Coop
- Average Load: 180 KW
- Peak: 360 KW
- $\sim 2$  million KWhrs/yr
- Wind Resource: 8 + m/s,
- Endangered species conflicts likely



# So What wind turbine?





# How much should we install?

Type	How it acts	Fuel saved	
		PEAK	ANNUAL
LOW	<ul style="list-style-type: none"> <li>• Diesel always runs</li> <li>• Limited fuel savings</li> <li>• Simple controls</li> </ul>	20 to 50%	maybe 20%
MEDIUM	<ul style="list-style-type: none"> <li>• Diesel continues to run</li> <li>• Recovered energy loads</li> <li>• What is the diesel and wind dispatch strategy?</li> <li>• Can we make effective use of the excess energy?</li> <li>• How much will it cost to upgrade to high penetration?</li> </ul>	40 to 50%	30%
HIGH	<ul style="list-style-type: none"> <li>• Diesels off, or very small diesel</li> <li>• Sophisticated controls</li> <li>• Can we make effective use of the excess energy?</li> <li>• What is the upgrade path way as the load grows?</li> <li>• Can we get Economies of scale in installation</li> </ul>	150% to ?	50% may be more

# Are we ready?

- Various projects planned in 2003,2004
- Surrounding communities, 2003,2004
- Must deal with potential siting issues
- 2004 high speed internet access likely

# Technology     Housekeeping

- Rural Energy Plan
- Work with USFWS (no developers \$/birds)
- Evaluation and Analysis of systems
- Tilt up tower for AOC 15-50
- Look closely at the Northwind 100
- Integrate complementary technologies

# Technology Issues 2002/2003

- Wales High Penetration Project  
Support/Evaluation
- Low Penetration Project (Selawik) (Combining, demonstrate project management improvements)
- Resource Monitoring (\$250,000/yr, 4 yrs)
- Data collection, communications, control (info over the internet)
- Design Standards (agreements on equipment and configurations)
- Turbine Mass Procurement

# What does this technology mean?

- Diesel plants will become more cost competitive
- Local/regional opportunities for job creation through component production, and cooperation to lower costs.
- Learning and collaboration extends to larger in-state and world markets

# Conclusions

- Given good wind resource and adequate project design, wind-diesel systems can compete with diesel for lowest long-term cost of electricity in a number of rural communities.
- Systems are likely to be common, if we can figure out what they can and need to look like...